THE UNIVERSITY OF OKLAHOMA

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ASSOCIATIVE LEARNING RATES OF SECOND-, FOURTH-, AND SIXTH-GRADE INDIAN AND WHITE CHILDREN USING A PAIRED-ASSOCIATE LEARNING TASK

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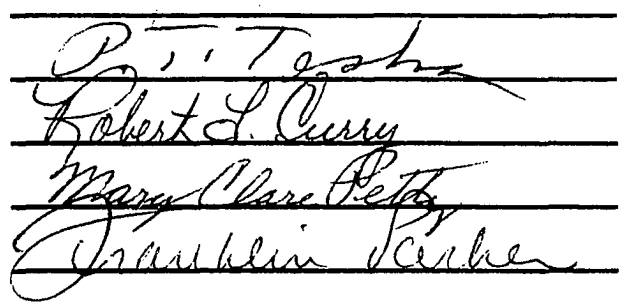

DISSERTATION COMMITTEE

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CHAPTER I

INTRODUCTION AND PROBLEM

The American Indians are certainly one of the most neglected cultural groups in the United States. There are several reasons for this neglect. First, the Indians have not migrated in great numbers to the large metropolitan areas of the United States as have the Chinese and Negroes; rather, they have been content to stay on their reservations or in small towns or rural areas. Second, since they have not migrated to the larger cities, they have offered little threat to the white man's jobs and homes. Third, the American Indian has retained many of his tribal ties and is governed by elected chiefs, who hold powerful influence over their tribal members. Finally, because they live in small towns and rural areas of the United States, they are not easily accessible to those who would study cultural minority groups.

For these reasons, few studies in the past

half-century have been attempted that seek to discover the intelligence, personality characteristics, or need-motivation constructs that are peculiar to the American Indian. One area in particular has not been investigated: the learning abilities of Indian children.

Studies Reporting the Intelligence of Indians

Studies that have been reported which are akin to studies of the ability of Indian children to learn are those investigating the intelligence of Indian children. Rowe (1914), in a study of 268 Indian children and 547 white children who were tested on the 1908 and 1914 Binet-Simon Intelligence tests, concluded that the "Indians are everywhere inferior to the whites." It appeared to Rowe, "that the only satisfactory explanation of their inferiority in terms of the tests is to be found in an inferiority of native ability." His reasoning for this conclusion was that he could find no differences between the white and Indian children that could "be explained by hygienic, social (or) educational" opportunities.

Hunter and Sommermier (1922) administered the 1919 edition of the Otis Group Intelligence Test to 715 Indians ranging in age from 11 to 25; most of the subjects were between 14 and 18 years of age. They were attending school at the Haskell Indian Institute, Lawrence, Kansas. The IQ scores obtained by the Indians on the Otis Intelligence

Test ranged from 1 to 169, with the median at 82.64. The median IQ score for a group of 1366 15-year-old whites on the same test was 122.58, a difference of about 40 points.

The National Intelligence Tests, Scale A, Form I, was administered by Garth, et al. (1925) to 1050 Indian children in the Federal Indian Schools at Chilocco, Oklahoma, and at Albuquerque, Santa Fe, and Shiprock, New Mexico, in an attempt to discover the approximate intelligence of Indian Children in the United States. They found that the median IQ score was 68.6 as measured by the National Intelligence Test, and that IQ scores increased with education and age. An interesting finding that is related to this present study is that although Garth and his associates tested 275 fourth- and 296 sixth-grade subjects, they discovered only eight children in the fourth grade and 18 children in the sixth grade who obtained an IQ score above 90.

In an attempt to offer possible explanations for the lower scores of Indian students on mental tests, Fitzgerald and Ludeman (1926) administered the National Intelligence Tests to 41 Indian students and the Terman Group Test of Mental Ability to 15 others at the Saint Mary's Mission School, Springfield, South Dakota. The Otis Group Intelligence Scale was administered to 42 white high-school students at the Santee Normal Training School, Santee, Nebraska. Both groups of students were between

the ages of 10 and 25 years. The median IQ score of the Indians was 87.5, which was slightly inferior to the median score of the whites. The investigators attributed the lower IQ scores of the Indians to differences in environmental backgrounds rather than to a lack of innate ability.

Dennis (1942) administered the Goodenough Draw-a-Man Test to 77 Hopi Indian boys and 75 Hopi Indian girls, six to ten years in age. He found that the girls' average IQ score was 99.5, the boys', 116.6. The group as a whole averaged 108.3, with a range of 64 to 185. He concluded that the reason the boys scored higher than did the girls was that graphic art is traditionally a masculine interest in Hopi culture.

Russell (1943) administered the Goodenough Draw-a-Man Test to 41 Zuni Indian children (mean chronological age, 8.03 $\pm$ 1.80) attending the Federal Indian School at Nutri, New Mexico. The mean IQ score for the 14 male subjects was 104.50 $\pm$ 15.13, and for the 27 female subjects, 105.61 $\pm$ 17.72. The range was from 75 to 150. The quantitative results indicated no inferiority of the Zuni subjects as compared to the Goodenough Draw-a-Man Test standardized norms.

Havighurst and Hilkevitch (1944) administered the Grace Author Point Performance Scale to 800 six- to fifteen-year-old reservation Indian children from six Indian tribes

in the West and Southwest: Sioux, Navaho, Papago, Hopi, Zuni, and Zia. The results of their study indicated that Indian children do about as well as do white children on this performance test of intelligence.

In every study it was found that Indian children and adolescents score below the national norms of various intelligence tests which require verbal abilities, such as the Binet-Simon, the Otis, the National, and the Terman; but on tests which require performance abilities, such as the Goodenough and the Grace Author, the Indian children's IQ scores are equal to, or better than, the standardized national norms.

Except for the study by Kuipers (1946), who developed an intelligence test for Indians, all of the intelligence tests which have been administered to the Indians have been standardized by using, for the most part, white cultural groups. Also, these tests, even the so-called performance tests, require the subjects either to read or to listen to verbal directions. If, for any reason, the subjects taking the tests have not had an opportunity to attend school regularly or if the schools and teachers have been of dubious quality, then quite naturally the subjects, because of lack of contact with formal learning environments, probably will do poorly on those tests that require verbal experience.

Research Related to the Learning Abilities of Other Culture Groups

In addition to the studies of Indians, many studies of various culture groups have indicated that children who score low in verbal abilities do so because of deprived cultural backgrounds and insufficient acculturation, rather than because of inadequate intelligence.

For example, in a study of English canal boat children who led a nomadic life in an impoverished, non-intellectual environment, Gaw (1925) found that the Binet tests correlated .58 with educational level, but that a performance test correlated only .26. Moreover, the performance IQ scores were about ten points higher than were the verbal IQ scores. From this study, Gaw concluded that those who have had contact with formal learning environments have a greater chance of scoring higher on Binet type items than do those who have had little contact with formal learning environments.

Furthermore, Thurstone (1935), who formulated Multiple-Factor Theories, found that people can have high mental ability, all tasks considered, without having exceptional verbal ability. This finding lends strength to Cronbach's (1960) argument. Cronbach maintains that since the great majority of intelligence test items require the ability to use and understand words, children who have

had poor schooling will do badly on tests such as these. He concludes that the reason for their relatively poor performance on intelligence tests is a lack of verbal ability rather than a lack of innate ability.

Davis (1951) concludes that mental tests which depend upon past schooling and school-related behavior tend to favor children who come from homes in which the parents are in professional, skilled, and white-collar cultural groups because such families value education as a means of maintaining a more desirable place in society. In other words, children who come from unskilled and semi-skilled cultural groups do not place as much emphasis on education; therefore, these children score relatively poorly on mental tests, not because they suffer from a lack of reasoning or mental ability, but rather, because they suffer from the way the tests are constructed around school-related abilities.

This idea is further supported by Fahmy (1954) in a study of a primitive tribe living in the deserts of Egypt. Fahmy concludes that on most performance tests of intelligence, the children of this tribe scored considerably below the European average norms for children of the same age. However, on a test that called for assembly of colored mosaics (similar to block design) these children averaged slightly above the European norms. The reason given for their achieving this higher score was the influence of

color in the ceremonies of this culture, which, it was thought, gave the people experience in developing designs and patterns.

These studies have suggested that lower average intelligence scores among cultural minority groups are caused by cultural mores and attitudes, by insufficient contact with schools, and by the way tests have been constructed and standardized, rather than from deficiencies in intelligence and learning abilities.

Intelligence and Learning

Intelligence has been defined as the ability to learn (English and English, 1958) and, as has been suggested, may be affected by environmental and cultural factors. McGeoch (1942) has defined learning as the improvement in performance resulting from repetitive practice in response to stimuli held constant throughout the learning period. He points out that the learning process involves changes in the rate, amount, and mode of acquisition.

When an individual learns, he is usually able to do something that heretofore he had been unable to do, and his learning is reflected in fundamental behavior changes. For example, an individual will probably learn to read and also, depending on the sex of the person, might learn to throw a baseball or to make a dress. The point is that an infant is not born with these abilities. Rather they must

be acquired or learned. The capacity or potentiality for acquiring or learning these abilities, as Anastasi (1958) discusses, is dependent upon the innate intelligence of each individual child, and this intelligence is modified by the individual's interaction with his environment.

Since the learning capacity of an individual depends a great deal upon his intelligence, the learning process is a vital component in determining whether one cultural group, white children, may have higher native intelligence than another cultural group, Indian children.

Therefore, one possible way to eliminate many of the cultural problems inherent in the tests and simultaneously to investigate intellectual ability of a cultural minority group, Indian children, is to give them a simple learning task.

Purpose of the Study

Thus, the purpose of this study is to ascertain whether rural Indian children--a cultural minority group--can learn a 16-picture paired-associate learning task with fewer trials or with fewer errors than can lower-to middle-class urban white children, matched with the Indian children as to sex, grade level, and IQ scores. If the assumption be true that the IQ tests now most widely used--the Otis, the Binet, the Wechsler, and others--have been constructed and standardized in such a way as to favor the child with

verbal fluency and the child whose family background would develop a positive attitude towards contact with school and towards learning verbal skills, then to the degree that intelligence is defined as the ability to learn, the cultural minority group should prove to have greater intellective capacity than their IQ scores indicate. If the Indian children learn the task with fewer trials or fewer errors than do their white counterparts, conclusions can be drawn that environment, background, culture, and attitudes towards learning play important roles in affecting IQ scores; and, therefore, that an IQ score may not reflect accurately the actual innate intelligence of the cultural minority, Indian children.

Background of Theory--Environment and Intelligence

Intelligence is usually measured by what a child knows or what kinds of problems he can solve. The degree to which a child has the opportunity to interact with his environment and the capacity of his mind to assimilate and understand his experiences in this environment determine what IQ score he will obtain on a mental test.

Piaget (1936), for example, maintains that feedback is very important. He argues that the more new things an infant has seen and heard, the more new things he is interested in seeing and hearing. Furthermore, he maintains that the more variation in reality he has coped with, within

reason, the greater is his capacity for coping.

McCandless (1952) also found that intelligence--that is, intelligence as it can be measured--reflects the amount of material available for learning, which appears to lend support to Piaget's observations.

Clark and Clark (1953) concluded from their study of 100 adolescent and adult mental defectives who were tested on the Wechsler Test (Form I) that a deprived home environment can retard mental ability for many years. However, they also found that after the subjects are removed from such conditions this retardation begins to fade and IQ increments occur, often at ages when mental growth is commonly assumed to have ceased.

Bayley (1955) in her review of the data from the Berkeley Growth Studies reported that "it is now well established that we cannot predict later intelligence from the scores on tests made in infancy." The reasons she gave for the unreliability of these infant IQ scores were that there are too many factors that alter intelligence, such as "emotional climate, cultural milieu, environmental deprivation ... and developmental changes in the nature and composition of the behaviors tested ...."

Some investigators have characterized the lower-class child from deprived environments as weak in conceptual ability (Siller, 1957), arithmetic concepts (Montague, 1964), and perceptual ability (Deutsch, 1967).

Pasamanick and Knoblock (1958) found that deprived populations had more psychomotor and behavioral disorders and greater reading disability than did middle to high economic populations. These findings, which are based upon a study of the relationship between income level, health status, and school adjustment, suggest a continuum of "reproductive errors". "Reproductive error" or developmental defect has a tendency to occur in direct relationship to the population for which medical, nutritional, and child care are the poorest. It was also discovered that "reproductive error" has a tendency to occur least in a population where such care is readily available. This "reproductive error" formulation, when applied to the question of social class, cultural, or racial differences in intellective level, has led to the general conclusion that such IQ score differences are a result of environmental deprivation rather than of inherited limited potential.

Berstein (1960) emphasizes that in lower-class families language is used in a convergent or restrictive fashion rather than in a divergent, elaborative fashion. He explains that in lower-class families an expletive or an imperative or a partial sentence frequently replaces a complete sentence or an explanation. Thus, these children do not get the feedback they need to develop verbal abilities.

Osborn (1960) made a longitudinal study of mental growth differences between whites and Negroes. He found,

after giving the California Achievement and Mental Maturity tests to 815 white children and 446 Negro children in 1954, 1956, and 1958, that Negroes had lower IQ scores than did whites, and that reading and arithmetic achievement differences increased progressively from sixth to tenth grade. He reasoned that the cause for the differences was poor early environment and limited educational opportunities.

Munn (1962) suggests that individuals with identical brains at birth would probably attain different levels of intelligence if subjected to widely different educational environments--that is, if one were reared in an enriched and the other in an impoverished intellectual climate.

Klineberg (1963), in a definitive review of the problem of lower IQ scores among culturally and environmentally deprived groups, found no scientifically acceptable evidence for the assumption that cultural groups differ in inherited mental ability.

Deutsch and Brown (1964), in a study similar to that of Pasamanick and Knoblock (1958), administered the Lorge-Thorndike, Level I, Primary Battery for first graders and Level III for fifth graders (essentially non-verbal tests) to 543 urban white and Negro school children stratified by race, grade level (first and fifth grades), and social class as measured by the Institute for Developmental Studies, Department of Psychiatry, New York Medical College Socio-economic Strata Scale (SES). They found

that as age and grade increased for both white and Negro children, there was a greater increase in intelligence test scores for the white group than for the Negroes. They also discovered that a linear relationship exists between SES and performance level for both white and Negro children. These findings, they concluded, appeared to lend support to the "cumulative deficit hypothesis." That is, as the age and grade of the Negro child increases, his participation in the cultural mainstream decreases, which also probably causes a decrease in intelligence test performance. That is not to say that the intelligence does not increase, but rather that intelligence tests as they are constructed do not measure the increase. An examination of the items in intelligence tests such as the Stanford-Binet Intelligence Scale and the Otis Quick-Scoring Mental Ability Test shows that as the child grows older, the questions that are asked him require an increasing amount of verbal ability to answer.

A core sample of 292 children and an extended population of about 2500 children of various racial and social class groupings were investigated and tested by Deutsch (1967). He constructed a "Deprivation Index" from a study of a collection of items from a questionnaire which was administered to a parent--usually the mother--of each of the children in the samples of a large-scale, cross-sectional study, the Verbal Survey. The samples for

this study were selected from populations of middle-class and lower-class, Negro and white, first- and fifth-grade children. The questionnaire included a number of items relating to aspects of family life, parents' aspirations for children, and the like. From this Verbal Survey, Deutsch found strong evidence to support the assumption that it is the active verbal engagement of people who surround the child that is the operative influence in the child's language development.

Furthermore, any individual child's performance on an intelligence test item will doubtless be affected also by whether the item happens to sample a particular experience with which the subject has come in contact. If a test is so constructed that there are a large number of items, then it would be expected that some of these discrepancies would average out, so long as the nature of the items is not systematically biased against a particular child. However, if a particular group of children has certain kinds of experiences more frequently than does another group and if the test items are standardized on the kind of material with which only one group is familiar, then systematic group differences in intelligence test scores would be expected. Thus, a child's IQ score on a mental test is affected not only by the innate intelligence of the individual--that is, the intelligence that the child inherits from his parents, as has been suggested--but also

by forces external to the child, such as social, economic, and environmental forces, as well as test standardizations.

There is, moreover, another very important factor inherent in any structured learning task: the attitude the individual has towards his ability to learn. Many factors influence the development of attitudes which a child holds towards himself. Primary among these is the esteem which he senses on the part of his peers and of adults who are significant to him, such as his parents, his other relatives and friends, and his teachers. In the school situation, if the child can demonstrate that he knows what the teacher expects him to know, he senses the teacher's approval, his confidence in his ability is reinforced, and he develops a favorable attitude towards his ability to learn.

Much of the learning that occurs in school is predicated on prior learning. For example, teachers usually assume that the kindergarten or first-grade child who is not mentally defective will know both his first and last names, his home address, the name of his school, and the city in which he lives, and that he will have some rudimentary understanding of number, name, and distance relationships. However, educational processes frequently proceed on assumptions derived from experiences with the middle-class child, who has usually had an opportunity to learn many of these rudimentary relationships. Many

problems in education arise from the fact that most of the individuals from deprived environments have not had the opportunity to learn these relationships.

Not only is the child from certain cultural minority groups handicapped by a lack of information about his family and home; frequently, the child has grown up in an environment in which there has been little opportunity for him to verbalize his thoughts and feelings as well. For instance, in the typical life of the Indian family, conversation between adults and children is not encouraged, and the adults frequently speak the tribal language much more fluently than they speak English. It has often been noted that Indian school children are much less prone to verbalize with their teachers or with any other adults than are white children.

Another restricting influence on many cultural minority groups is the lack of variety of experiences to which the child has been exposed. Not only have many of these children never held a conversation with an adult; many of them have never been outside their own neighborhoods; their homes may contain no books or magazines, pencils or pens, televisions or toys, clocks or watches, and very little space in which each person may move about. They may have had little experience with an adult in the home who goes regularly to a job or who buys any variety of groceries or prepares meals at which the family sits

together. The children may spend many hours simply standing, sitting, or lying around, or doing menial and uninspiring kinds of work for which they receive little or no reward.

This background of extremely limited variety of experiences may well be largely the cause of negative attitudes towards learning. Not only has the child been accustomed to spending his time in passive inaction and inattention to his surroundings, but also this lack of variety does not allow him to build up a core of basic information to which he can relate new information and knowledge. In many of the studies already cited, the authors concluded that the reasons for lower scores on mental tests by culturally deprived groups were directly related to insufficient acculturation into the cultural mainstream.

Thus, because of a deprivation of variety of early experiences, the child from the deprived environment does not acquire the basic knowledge vital to success in school. Negative attitudes towards learning are fostered through the frustrations inherent in not understanding, not succeeding, and not being stimulated in the school; in fact, because he is regulated by it, school creates a basis for further development of low evaluations of his individual worth and of negative attitudes towards school and towards his ability to learn. That is, he "knows" from multiple experiences that he "cannot learn," and when faced with a learning task, he approaches it apathetically and gives up

easily, seldom pursuing more than one avenue towards a solution to the learning task, confident that he cannot accomplish the task.

In the non-deprived environment, these same factors --that is, the environmental background and the variety of experiences available to the individual in the environment --quite often foster positive attitudes towards school and the learning experiences inherent in the school climate. In this environment, as Davis (1951) suggests, education becomes a means of maintaining or acquiring a more desirable place in society. Learning is encouraged at home and praise is given for success. Thus, the individual develops a high evaluation of his individual worth, positive attitudes towards school and towards his ability to learn, and when faced with a learning task, he attacks it with vigor and confidence that he will accomplish the task.

The point is, the attitude towards any learning experience may be affected by the environment: the very factors that enable the individual from a non-deprived environment to score high on a test of intellective capacity probably also will enable him to score high on any kind of test requiring use of the intellect; the opposite effect probably occurs for the individual from the deprived environment.

Statement of the Problem

The studies cited herein show that individuals from deprived cultural and environmental groups often fail to do as well on mental tests as do those who are in the cultural mainstream. The basic reasons given for these lower intelligence scores are that these individuals from deprived environments do not have the background, the variety of experiences, or the positive attitudes necessary to do well on these mental tests.

The problem in this study, therefore, is to determine whether, in a controlled experiment, Indian children from a rural, deprived environment will learn a 16-picture paired-associate learning task with the same number of trials or the same number of errors as will a group of white children from a low to middle socio-economic urban background, when the groups are matched for sex, grade, and IQ scores from the Otis Quick-Scoring Mental Ability Test.

If the Indian children, in learning the task, require fewer trials, or if they make fewer errors, the reason may be that the Indian children are more intelligent than their IQ scores show. That is, in order to do as well on a mental test as the white children do, the Indian children probably must have a greater innate intellective capacity. Using white subjects from a low- to middle-class

socio-economic area reduces the differences in background and experiences.

Hypotheses

It was hypothesized that Indian children from a rural, deprived environment will learn a 16-picture paired-associate learning task with the same number of trials or the same number of errors as will a group of white children from a low to middle socio-economic urban background, when the groups are matched for sex, grade, and IQ scores from the Otis Quick-Scoring Mental Ability Test. The following null hypotheses were tested for statistical significance:

1. There is no statistically significant difference in the number of trials between second-grade Indians and whites.

2. There is no statistically significant difference in the number of trials between fourth-grade Indians and whites.

3. There is no statistically significant difference in the number of trials between sixth-grade Indians and whites.

4. There is no statistically significant difference in the number of errors between second-grade Indians and whites.

5. There is no statistically significant difference in the number of errors between fourth-grade Indians

and whites.

6. There is no statistically significant difference in the number of errors between sixth-grade Indians and whites.

The level of statistical significance required to support the trial hypotheses and the F-Test was set at $p < .05$.

CHAPTER II

METHOD

The Subjects

The subjects in this study were 216 boys and girls in the second, fourth, and sixth grades, randomly selected from school districts in central and northeastern Oklahoma. The white children were selected from low- to middle-class income families in Shawnee, Oklahoma. The Indian children, in order to obtain a representative sample of rural Indians and to fill the prescribed sample quota, were selected from the Seneca Federal Indian School at Wyandotte, Oklahoma, the Oaks Public School District in Oaks, Oklahoma, the Kansas Public School District in Kansas, Oklahoma, and the East Public School in Anadarko, Oklahoma.

The criterion used to obtain the Indian sample was based on the policy of the Bureau of Indian Affairs at Muskogee, Oklahoma. They consider a person an Indian who has one-quarter Indian blood or more. In this study, however, only four children were used with this degree of Indian blood.

There were 72 subjects at each grade level, 36

Indian children and 36 white children. All subjects at each grade level ranged from 90 to 110 in IQ scores as measured by the Otis Quick-Scoring Mental Ability Test. The Otis Alpha, Form A, was used for the second grades, while the Otis Beta, Form B, was used for the fourth and sixth grades. The average chronological age in months for each grade level was as follows: second-grade Indians, 91.4; second-grade whites, 91.7; fourth-grade Indians, 119.2; fourth-grade whites, 121.3; sixth-grade Indians, 143.0; and sixth-grade whites, 142.2. The subjects, except for equating of sex, were randomly selected within each of the experimental groups by first identifying those children who scored between 90 and 110 on the Otis Test, then placing the names of these subjects in a container and drawing from the container the required number of subjects needed for the study.

The Test Instrument

The test materials were the same in format, except for the number of stimulus and response cards, as used by Hiner (1962). The materials consisted of two booklets, each containing, in addition to the sample, 16 five-by-eight-inch white cardboard cards in a small spiral notebook. Booklet One, the stimulus set, contained one pair of outline pictures of common objects as follows: skate-ring (sample), bread-clock, tree-shoe, kite-fish, coat-sun, duck-saw,

bird-lamp, hat-cup, comb-drum, leaf-house, chair-dress, box-pig, car-fork, tent-brush, glass-dog, frog-broom, and cat-bed, in that order. Booklet Two contained only the first picture of the stimulus set.

In her investigation, Hiner used a 12-pair list but was unable to find any statistically significant differences in the ability of retarded, normal, and bright children to learn the 12-pair list. Therefore, a 16-pair list was used in this study. This list was found by Welsh (1967) to be somewhat more difficult to learn as evidenced by the fact that bright children required statistically significantly fewer trials (at the .01 level) to learn the list than did retarded children.

Since the 16-pair list, as shown by Welsh, is somewhat more difficult to learn, it was used in this study in order to show greater discrimination among the grade levels and between the two cultural groups, as it did among the intelligence groupings in the study by Welsh. Also, in a small pilot study done by this author, the results indicated that the average time taken by the second graders to learn the 16-pair list appeared to be the maximum time that the second-grade subjects could concentrate before fatigue and boredom became evident, even though the pictures in the learning task in this study were found by Hiner and Welsh, after extensive testing, to be pictures that were easily and instantly recognized by kindergarten children.

An individual record sheet was used for each subject, on which was recorded the name of the subject, the school, the grade level, and the name of the examiner. The sheet also contained columns for the scoring of each response made, the total number of trials required to learn the task, and the total number of errors made by the subject while learning the task.

The Examiners

This author and five graduate and senior students (three males and three females in all) in the Special Education Department at the University of Oklahoma, who had had experience in administering tests and working with children, served as the examiners. Each examiner tested an equal number of subjects.

Procedure

The subjects were selected by first giving the Otis Quick-Scoring Mental Ability Test to each grade level. Those children who obtained an IQ score between 90 and 110, as measured by the Otis, were then randomly selected, as previously explained, to be given the 16-picture paired-associate learning task.

Each subject was tested individually in a room, usually the school auditorium or library, which was as isolated as possible from ongoing school activities. The

subject was asked to sit to the left of and at a right angle to the examiner, who sat at the end of a table or desk.

The following instructions were given to each subject:

> Here are a number of cards. (The examiner opens Booklet One.) Each card in this set has two pictures on it. (The examiner shows the subject the sample pair.) Look at both pictures carefully and try to remember which two pictures go together. (The examiner then closes Booklet One and shows the subject Booklet Two.) Then I will show you another set of cards like these, with only the first picture showing. (The examiner shows the sample card.) I want you to tell me which picture went with this picture. (The examiner pauses for the answer before he gives further instructions.) So, as you see the two pictures together, try to remember which two pictures went together. Do you understand what you are supposed to do?

If the subject failed to answer the sample card correctly, the examiner restated the appropriate instructions, repeating the example until the examiner was satisfied the subject understood the nature of the task.

Then the paired pictures were presented singly to each subject at the rate of one every three seconds. Following this presentation, Booklet Two was opened and the first picture of each pair was presented singly at the rate of one every five seconds. The examiner scored each oral response made by the subject. For each correct response a plus (+) was recorded and for each incorrect response a zero (0) was recorded. If the subject failed

to give a response of any kind after five seconds had elapsed, he or she was given a zero. Additional trials were then administered until the subject reached the learning criterion of two successive, correct repetitions of the list. Intertrial intervals were ten seconds in length. Between trials the examiner said:

> Now we will look at the pictures again. Try to remember what two pictures were together.

If the subject questioned the examiner about the test, the examiner added:

> We will keep looking at the pairs of pictures until you learn all of them.

Subjects who failed to give even one correct response on any of the first five trials were considered as having failed to understand the task and, consequently, were eliminated from the population sample. Only three subjects, all second-graders, were eliminated for this reason.

CHAPTER III

RESULTS

Two hundred and sixteen Indian and white children from central and northeastern Oklahoma in the second, fourth, and sixth grades were tested to compare the rate of learning of two different cultural groups, using a 16-picture paired-associate learning task. All groups of children ranged in IQ score from 90 to 110 as measured by the Otis Group Mental Ability Test, Forms A and B. There were 36 subjects in each group, for a total of 72 subjects in each grade.

F tests for homogeneity of variance (Popham, 1967) for both the trial and the error dependent measures were tabulated for each grade group to determine whether the assumption of homogeneity was met. Neither the error measure nor the trial measure for each grade failed to meet the assumption of homogeneity of variance. Since this assumption was met, a pooled variance t-test (Popham, 1967) was employed in the statistical analysis of the data to compare mean trials and errors of each grade.

The trials and errors were directly computed from

the subject's performance. A subject was considered to have learned the 16-picture paired-associate learning task when he was able successfully to repeat the paired associations twice in succession without making an error. For example, if the subject successfully repeated the paired-association on trials nine and ten, he was given a trial score of nine.

An error was recorded when the subject failed to give the correct response when shown the stimulus or when he failed to respond within five seconds after being shown the stimulus; for example, if the subject was shown a picture of a tent and responded with the wrong answer, or did not respond within five seconds, his response or non-response was recorded as an error.

Experimental Hypotheses Concerning Trials

Table 1 reveals the total number of trials required by the Indians and whites in each grade to master the task. This Table shows that as the age and grade of the children increase, the total number of trials required to learn the task decreases.

The 36 second-grade Indians required a total of 351 trials to learn the task, while the 36 second-grade whites needed 371 trials to learn the task, for a total of 722 trials. Table 1 also shows that the trials of the second-grade Indians and whites meet the assumption of homogeneity of variance (F=1.1072, $p > .05$, not significant).

The first hypothesis stated that there is no statistically significant difference in the number of trials between second-grade Indians and whites. As revealed in Table 1, this hypothesis is supported (t=0.6986, df=70, $p > .05$, not significant).

TABLE 1

TOTAL TRIALS, F-TEST AND t-TEST (N=36)

Grade	Subjects	Trials	F-Test	t-Test
2nd	Indians	351	1.1072	0.6986
	Whites	371		
Total		722		
4th	Indians	257	1.3928	0.6906
	Whites	270		
Total		527		
6th	Indians	218	1.5560	2.5232 Significant
	Whites	266		
Total		484		

Table 1 reveals that the 36 fourth-grade Indians, in order to learn the task, required 257 trials, while the 36 whites required 270 trials to learn the task, for a total of 527 trials. Also, Table 1 shows that the trials of the fourth-grade Indians and whites meet the assumption

of homogeneity of variance (F=1.3928, $p > .05$, not significant).

The second hypothesis stated that there is no statistically significant difference in the number of trials between fourth-grade Indians and whites. As shown in Table 1, this hypothesis is supported (t=0.6906, df=70, $p > .05$, not significant).

Table 1 reveals that the 36 sixth-grade Indians required 218 trials to learn the task, while the 36 sixth-grade whites required 266 trials to learn the task. Table 1, furthermore, shows that the trials of the sixth-grade Indians and whites meet the assumption of homogeneity of variance (F=1.5560, $p > .05$, not significant).

The third hypothesis stated that there is no statistically significant difference in the number of trials between sixth-grade Indians and whites. As revealed in Table 1, this hypothesis is not supported (t=2.5232, df=70, $p < .05$, significant).

Experimental Hypotheses Concerning Errors

Table 2 shows the total number of errors made at each grade level. This Table shows that as the age and grade of the subjects increase, the total number of errors made on the learning task decreases.

The 36 second-grade Indians made a total of 2118 errors before the 16-picture paired-associate task was

learned, while the white subjects made a total of 2160 errors before accomplishing the learning task. Both groups made a total of 4278 errors. Moreover, Table 2 shows that the assumption of homogeneity of variance was met (F=1.1476, p >.05, not significant).

TABLE 2

TOTAL ERRORS, F-TEST AND t-TEST (N-36)

Grade	Subjects	Errors	F-Test	t-Test
2nd	Indians	2118	1.1476	0.2036
	Whites	2160		
Total		4278		
4th	Indians	1566	1.1476	0.2036
	Whites	1576		
Total		3142		
6th	Indians	1233	1.1932	1.6963
	Whites	1463		
Total		2696		

The fourth hypothesis stated that there is no statistically significant difference in the number of errors between second-grade Indians and whites. As indicated by Table 2, this hypothesis is supported (t=0.2036, df=70,

$p > .05$, not significant).

Table 2 reveals that the 36 fourth-grade Indians made 1566 errors, while the 36 whites made 1576 errors, for a total of 3142 errors for both groups. The assumption of homogeneity of variance was met ($F=1.1476$, $p > .05$, not significant).

The fifth hypothesis stated that there is no statictically significant difference in the number of errors between fourth-grade Indians and whites. As shown by Table 2, this hypothesis is supported ($t=0.2036$, df=70, $p > .05$, not significant).

Table 2 reveals that the 36 sixth-grade Indians made 1233 errors, while the 36 sixth-grade whites made 1463 errors. The total errors for both groups was 2696. The assumption of homogeneity of variance was met ($F=1.932$, $p > .05$, not significant).

The sixth hypothesis stated that there is no statistically significant difference in the number of errors between sixth-grade Indians and whites. As shown by Table 2, this hypothesis is supported ($t=1.6963$, df=70, $p > .05$, not significant).

Learning Characteristics of Second-, Fourth-, and Sixth-Grade Subjects

Certain learning characteristics of each of the grade groups were examined in order to contribute more

explicit information concerning the experimental results. The trial measure was used to illustrate these characteristics because it apparently afforded a more accurate measure of learning than did the error scores. Table 3 shows the point on the learning continuum at which the completion of the learning task occurred for each subject in each group.

TABLE 3

THE COMPLETION OF THE LEARNING TASK TO NUMBER OF TRIALS

Trial Number	6th Grade		4th Grade		2nd Grade	
	I*	W*	I*	W*	I*	W*
1						
2						
3	1	3	1	1		
4	9	2	2	2	1	
5	8	4	4	5	1	1
6	3	3	9	6	4	1
7	6	6	5	6	2	6
8	3	6	5	3	5	6
9	3	5	5	5	7	4
10	3	3	4	3	5	4
11		2		4	3	4
12		2	1		2	2
13				1		1
14					1	1
15					2	2
16					1	1
17					2	1
18						2
19						
20						
Mean	6.0	7.4	7.1	7.5	9.8	10.3
Standard Deviation	1.9	2.4	2.0	2.4	3.2	3.4

* I = Indians; W = Whites.

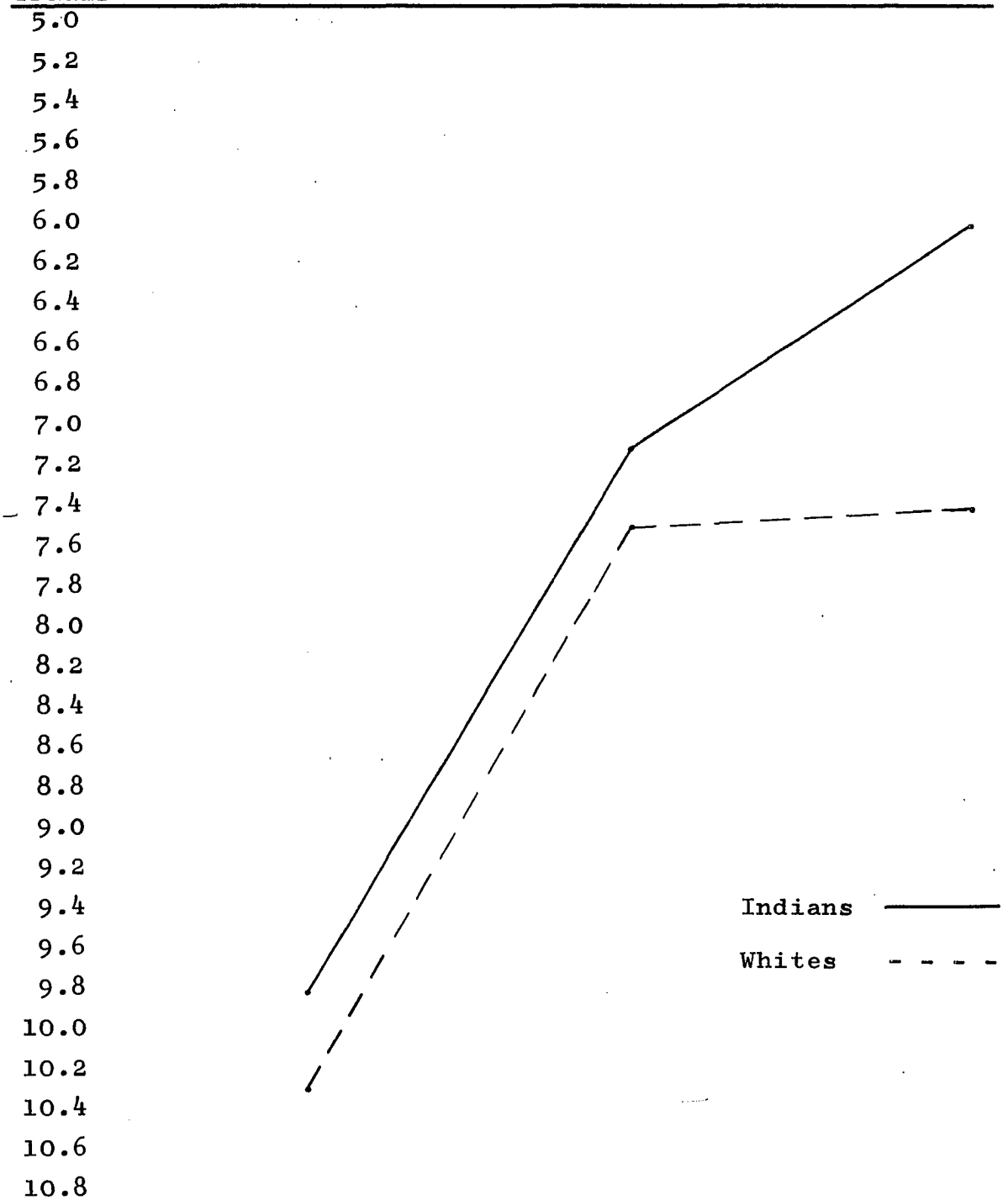
The sixth-grade subjects ranged in score from three to ten, while the fourth-grade subjects ranged in score from three to twelve, which is not as variable as the range of the second graders, who scored between three and eighteen. The variability of each group is shown by the standard deviation at the bottom of Table 3. Within each grade the measure of variability for the white subjects is greater than for the Indian subjects, with a noticeable difference evident at the sixth-grade level, as shown on Table 3.

By computing the means for the sixth, fourth, and second grades, the learning trends of the Indian and white subjects at each grade level were examined. These trends are represented graphically in Table 4. Beginning with the second grade, a linear trend is evident, rising from more trials to fewer trials as the grades and ages of the subjects increase. However, the required number of trials for the white subjects assumes a nearly horizontal plane between the fourth and sixth grades, indicating an equal ability to learn the sixteen trials. The Indian subjects, however, do not exhibit this horizontal plane between the fourth and sixth grades. Rather, there is a continual decrease in the number of trials required to learn the sixteen pairs of pictures as the age and grade of the subjects increase.

Furthermore, Table 4 shows that at all grade levels the Indian subjects required fewer trials than did the white subjects.

TABLE 4

LEARNING TRENDS OF SECOND-, FOURTH-, AND SIXTH-GRADE SUBJECTS, USING A 16-PICTURE PAIRED-ASSOCIATE LEARNING TASK



CHAPTER IV

DISCUSSION

Ever since Binet began his work on the construction of an instrument for measuring intelligence, the effects of environment on inherited intelligence has been discussed. The question that was raised was not whether environment has an effect on intelligence, but rather, how much effect it has if one assumes that two individuals in two different environments have about the same innate capacity. Burks (1928) concluded, in a study of the relationship between environment and heredity, that about 17 per cent of the differences in children's IQ scores could be accounted for on the basis of environment alone. Later, in a reanalysis of her own data, supplemented by the findings of Leahy (1935), Burks (1938) increased her estimate of environmental influences on children's IQ scores to about 25 per cent.

Today, however, most psychologists have concluded that intellective level, or intelligence as it is measured, is influenced by the environment of which an individual is a part, although few psychologists, if any, are willing to

take a stand on exactly what percentage the influence is. Hebb (1958) makes a very sound argument against those who are still attempting to prove that environment has a certain percentage of influence on intelligence. He states:

> The student may find it said for example, that 80 per cent of intelligence is determined by heredity, 20 per cent by environment. This statement is, on the face of it, nonsense. It means that a man would have 80 per cent of the problem-solving ability he would otherwise have had, if he were never given the opportunity to learn a language, never learned how people behave, and so forth. Conversely, it means that 20 per cent of a man's problem-solving capacity will result from a good environment, no matter what heredity is involved, which we know of course is not true. What we must say is that both these are of 100 per cent importance: their relation is not additive but multiplicative. To ask how much heredity contributes to intelligence is like asking how much the width of a field contributes to its area [Hebb, 1958, p. 128-129].

Furthermore, the contributions of heredity and environment to intelligence are discussed by Anastasi (1958), who contends that "The only possible conclusion from such research would thus seem to be that both heredity and environment contribute to all behavior traits and that the extent of their respective contributions cannot be specified for any trait."

If every individual in society had exactly the same opportunity, encouragement, motivation, personality, education, and environmental background, and if the things that had to be learned in order to function effectively in society were common to all, then a mental test

score would undoubtedly be a fairly accurate measure of intellective ability. However, this is not the case. There are many different races, cultures, and environments in rural and urban North America that propagate beliefs, ideals, and interests within their own societies and pass these ideals on to the general society which constitutes the North American or Western culture.

Because individuals do not have common backgrounds it would appear impossible, at the present time, to construct a mental test that would accurately measure the intelligence of all people in this society. For example, how would it be possible to measure accurately the intelligence of Puerto Ricans in New York City and the Indians of Oaks, Oklahoma, with the same kind of mental test? For the structure and questions of mental tests are such that all that is measured is what an individual has had an opportunity to learn. If an individual has had little opportunity to learn, even if his inherited intelligence is above that of most of those with whom he associates, he will, in all probability, not be as successful on a mental test as an individual who has had many opportunities to learn, even though this individual's innate intelligence may not be as great.

Deutsch, et al. (1967) point out that a poor environment offers a restricted range of experience and therefore a reduced range of variation. With less variety

and fewer opportunities to learn in the restricted environment, a lack of experience develops with which to adapt to and function effectively in society. Deutsch, furthermore, maintains that this lack of experience may have an effect on learning skills and abilities. Therefore, he concludes that "this might well be a crucial factor in the poorer performance of lower socio-economic children on standardized tests of intelligence." Moreover, he contends that on standardized tests of intelligence the child from a deprived socio-economic background "is compared with others of his own age. But, if his point of development in relation to the maturational ceiling for his age group is influenced by his experience, then the child with restricted experience may actually be developed to a proportionally lower level of his own actual ceiling." The probable reason for these lower scores among children from deprived socio-economic backgrounds is that mental tests are such that all that is measured is mean performance of a standardized group. This group sets the standard to which all who later take the mental test are compared.

The results of the present study offer further evidence that environment is, as Deutsch stated, "a crucial factor" in the performance of children on standardized tests of intelligence. This study was undertaken to determine whether rural Indian children--a cultural minority group--can learn a 16-picture paired-associate learning

task with fewer trials or fewer errors than the middle to lower class urban white children, matched with the Indian children as to sex, grade level, and IQ scores. To select the subjects, the Otis Quick-Scoring Mental Ability Test, Forms A and B, was given to a large group of Indians and whites in the second, fourth and sixth grades. Those children who obtained an IQ score between 90 and 110 were then randomly selected. The pictures in the learning task had been found, after extensive testing by Hiner (1962) and Welsh (1967) to be easily recognizable by kindergarten children. This study showed that the Indian subjects in the second and fourth grades did not differ statistically significantly from the white subjects in the number of trials necessary to learn the task, even though at both of these levels they did require fewer trials to learn the task. However, at the sixth-grade level, there was a statistically significant difference at the .05 level of confidence in the number of trials required to learn the task (Table 1). This difference at the sixth-grade level suggests that the Indian children were probably more intelligent than the Otis test score showed them to be.

Table 3 shows the relationship between the number of trials required by each subject to learn the task and the number of subjects who learned the task at each trial level. At the sixth-grade level Table 3 shows that 18 Indian subjects required only five or fewer trials to

learn the task; this is one-half of the total Indian sample. However, only nine white subjects were able to learn the task in five or fewer trials; this is one-fourth of the total white sample. Although three-fourths of the Indian subjects learned the task in seven trials or fewer, two more than three-fourths of the total white subjects (29 of the 36 white subjects) required nine or fewer trials to learn the task. That is, about three-fourths of the Indian sample required two trials less than did the white subjects to learn the task. Furthermore, the trials for the whites approximate a normal curve, whereas the trials for the Indians indicate a curve skewed towards fewer trials; also, the means of the two groups are different, the Indians requiring a mean of 6.0 trials and the whites requiring a mean of 7.4 trials to learn the task.

Table 4 shows the average trials for each group. From second through sixth grade, the Indian subjects exhibit a linear trend towards fewer trials, while the white sixth-grade subjects do not do much better than the white fourth-grade subjects. This appears to indicate a leveling off of ability to accomplish the task among the white subjects. However, because the Indians continue to require fewer trials, this would indicate that the Indians are brighter than the whites at each grade level and significantly brighter at the sixth-grade level, even though they obtained the same IQ score as the white subjects on the

Otis test.

The errors--that is, the children's incorrect responses and non-responses during the trials--were tabulated for each subject, and the total number of errors made by each of the six groups of subjects is shown in Table 2. The total number of errors made by each group diminished as age and grade of the subjects increased. Differences in total number of errors made by the Indian subjects and by the white subjects were not statistically significant at either of the three grade levels. However, the Indian subjects at each grade level made fewer total errors than did the white subjects. At the sixth-grade level, the difference is greater than at the earlier grade levels, which lends further support to the conclusion that the Indian children at the sixth-grade level are innately brighter than are the sixth-grade white children in this sample, even though their IQ scores indicate that their intellective level is the same.

Conclusions

The reason the differences were not statistically significant between the Indians and the whites in learning the task at the second- and fourth-grade levels may well be that at these early ages the culture and environment of these Indian children has not yet deprived them of enough school-related and learning experiences to have a

detrimental effect on their attitudes towards their ability to learn, as well as on their general ability to do as well as the whites on an IQ score. However, by the time the children reach the sixth-grade level, the gap has widened between the Indians and the whites because the accumulative years in a deprived and semi-isolated environment have not led to the broadening of experiences enjoyed by the whites. At this age level, the Otis, as well as many other mental tests, assumes that the subjects have had a rather extensive reading and language background. Also, the structure of the test and the kinds of questions asked assume that the children have had several years of school-related experiences.

Environmental differences between the whites and the Indians do not affect performance on this simple picture paired-associate learning task. This type of learning task is not dependent upon the ability to read and comprehend, nor upon school-related experiences other than confidence in the individual's ability to learn. It is a simple task in which a subject must remember which two pictures go together.

The reason Indian subjects, at the sixth-grade level, were able to learn a picture paired-associate learning task in significantly fewer trials than were the white sixth-grade subjects may well be that the Indians are more intelligent, even though both groups of subjects had

an IQ score between 90 and 110 on the Otis.

As Munn (1951) points out, mental tests are not measuring intelligence in any absolute sense, but rather they are measuring relative performance. If an individual's background, experience, and attitudes are limited, then his performance on a mental test will also probably be limited.

Anastasi (1937) best summarizes the problem of giving mental tests to subjects from deprived and rural environments. She states:

> It would seem that intelligence tests measure only the ability to succeed in our culture. Each culture, partly through the physical conditions of its environment and partly through social tradition, "selects" certain activities as the most significant. These it encourages and stimulates; others it neglects or definitely suppresses. The relative standing of different cultural groups in "intelligence" is a function of the traits included under the concept of intelligence, or, to state the same point differently, it is a function of the particular culture in which the test was constructed [Anastasi, 1937, p. 511].

The purpose of this study was to determine whether second-, fourth-, and sixth-grade Indian children from a rural, deprived environment would learn a 16-picture paired-associate learning task with fewer trials or with fewer errors than would white children from a low to middle socio-economic environment, matched for sex, grade level, and IQ scores on the Otis Quick-Scoring Mental Ability Test. Inasmuch as the Indians at each grade level learned the task with fewer trials and fewer errors and the Indians at the sixth grade learned the task with statistically

significantly fewer trials (to the .05 level of significance) than did the sixth-grade whites, these conclusions are evident: (1) that to the degree that intelligence is defined as the ability to learn, the sixth-grade Indians are innately more intelligent than are the sixth-grade whites in this sample, even though their IQ scores on the Otis Quick-Scoring Mental Ability Test are the same; (2) that the sixth-grade Indians' deprived environmental background and their attitudes towards themselves and towards their ability to learn caused them to score no better on the Otis Quick-Scoring Mental Ability Test than their white counterparts scored, even though their ability to learn the 16-picture paired-associate learning task in statistically significantly fewer trials than did their white counterparts gives evidence that the Indians are innately brighter. The evidence which leads to these conclusions leads to a third conclusion: that on the learning task used in this study, the Indians scored better (and the sixth-grade Indians scored statistically significantly better) than did their white counterparts in spite of the fact that the whites probably have more positive attitudes towards their ability to learn the task, whereas the Indians probably have more negative attitudes towards their ability to learn the task.

CHAPTER V

SUMMARY

The purpose of this experimental study is to ascertain whether Indian children from a rural, deprived environment will learn a 16-picture paired-associate learning task in fewer trials or with fewer errors than will white children from an urban, lower to middle socio-economic environment, matched as to sex, grade level, and IQ scores. If the Indians learn the task with fewer trials or with fewer errors than do the whites, conclusions can be drawn that environmental background, culture, variety of experiences, and attitudes of subjects towards themselves and towards their ability to learn play important roles in affecting IQ scores; therefore, that an IQ score may not accurately reflect the actual innate intelligence of a cultural minority group, Indian children.

The Otis Quick-Scoring Test of Mental Ability was first given to a large group of Indians and whites in order to find those children at the second, fourth, and sixth grades whose IQ scores were between 90 and 110. These children, 36 North American Indians and 36 whites, equated

for sex and IQ score at each grade level, a total of 216 children, were then given a 16-picture paired-associate learning task.

It was hypothesized that there would be no significant differences in the number of trials or the number of errors of the Indian and white subjects at the second, fourth, and sixth grades in learning the task. All hypotheses were supported except one. At the sixth grade, the Indians required statistically significantly fewer trials than did the whites to learn the task. The level of confidence to support the hypotheses was set at $p < .05$.

A pooled-variance *t*-Test (Popham, 1967) was used in the statistical analysis of the data after an *F*-test (Popham, 1967) for homogeneity of variance was assured.

Previous studies have indicated that Indians from rural, deprived environments do less well on tests of intelligence than do white children from urban, non-deprived environments. Many studies have indicated that the reason for these lower IQ scores is insufficient acculturation into the cultural mainstream, rather than a lack of innate intelligence, and that a child from a deprived environment suffers not only from a lack of variety and stimulation in his home life, but also from negative attitudes. He lacks a basic core of information, which the child from the non-deprived environment usually has before he enters school. Therefore, he cannot compete with children his own age and

becomes quite frustrated by the total school atmosphere. Furthermore, a deprived environment does not allow the child to learn and broaden his experiences, which results in increasing his inability to do well on an intelligence test and fosters an increasingly low evaluation of his individual competencies and of his ability to learn.

On the contrary, the child from a non-deprived environment develops positive attitudes towards school and his ability to learn and consequently approaches any learning task with a higher positive attitude that allows him to do better on any intellective task.

Inasmuch as the Indians at each grade level learned the task with fewer trials and fewer errors and the Indians at the sixth grade learned the task with statistically significantly fewer trials (to the .05 level of significance) than did the sixth-grade whites, these conclusions are evident: (1) that to the degree that intelligence is defined as the ability to learn, the sixth-grade Indians are innately more intelligent than are the sixth-grade whites in this sample, even though their IQ scores on the Otis Quick-Scoring Mental Ability Test are the same; (2) that the sixth-grade Indians' deprived environmental background and their attitudes towards themselves and towards their ability to learn caused them to score no better on the Otis Quick-Scoring Mental Ability Test than their white counterparts scored, even though their ability

to learn the 16-picture paired-associate learning task in statistically significantly fewer trials than did their white counterparts gives evidence that the Indians are innately brighter. The evidence which leads to these conclusions leads to a third conclusion: that on the learning task used in this study, the Indians scored better (and the sixth-grade Indians scored statistically significantly better) than did their white counterparts in spite of the fact that the whites probably have more positive attitudes towards their ability to learn the task, whereas the Indians probably have more negative attitudes towards their ability to learn the task.

Implications for Further Research

Results of this study indicate a need for further research into differences which might exist between children from high socio-economic levels, where school is a means of maintaining a more desirable place in society, and children from deprived environments, where there is little interest in school. It may well be that children from the high socio-economic areas, when IQ scores are matched, may do less well on a picture paired-associate learning task than will children from middle to low socio-economic areas, because of the emphasis placed on learning in the high socio-economic areas. If this should prove to be true, then there might be even a larger statistical difference

in learning the paired-associate learning task between deprived cultural groups and high socio-economic groups.

Another study that might be revealing would be to compare children from low to middle class urban environments who score above 110 on an IQ test with rural, deprived children having lower IQ scores, on a paired-associate learning task, to find out if there are any differences in learning the task. If there were no differences in learning the task, even though there were differences in their IQ scores, it might be assumed that the children from the rural, deprived environments were just as innately intelligent as the children from the urban areas who scored at a higher level on an IQ test.

REFERENCES

Anastasi, Anne. Differential Psychology. New York: The Macmillan Company, 1937.

_____. "Heredity, Environment and the Question, How?" Psychological Review, LXV (1958), 197-208.

_____. Psychological Research and Educational Desegregation. A Catholic Case Against Segregation. Edited by Joseph E. O'Neill. New York: Macmillan Company, 1961.

Bayley, Nancy. "On the Growth of Intelligence," The American Psychologist, X (1955), 805-818.

Bernstein, B. "Language and Social Class," British Journal of Sociology, XI (1960), 47-59.

Burks, B. S. "The Relative Influence of Nature and Nurture Upon Mental Development: A Comparative Study of Foster Parent-Foster Resemblance and True Parent-True Child Resemblance," Twenty-Seventh Yearbook, National Society of Studies in Education, Part I, 1928, 219-316.

_____. "On the Relative Contributions of Nature and Nurture to Average Group Differences in Intelligence," Proceedings of the National Academy of Science, XXIV (1938), 276-282.

Clarke, A.D.B., and Clarke, A. M. "How Constant is the I.Q.?", Lancet, CCLXV (1953), 877-880.

Cronbach, Lee J. Essentials of Psychological Testing. New York: Harper and Brothers, 1960.

Davis, Allison. "Socio-economic Influences Upon Children's Learning," Understanding the Child, XX (1951), 10-16.

Dennis, W. "The Performance of Hopi Children on the Good-enough Draw-a-Man Test," Journal of Comparative Psychology, XXXIV (1942), 341-348.

Deutsch, Martin, and Brown, Bert. "Social Influences in Negro-White Intelligence Differences," Journal of Social Issues, XX, No. 2 (1964), 24-35.

Deutsch, Martin, et al. The Disadvantaged Child. New York and London: Basic Books, Inc., 1967.

Dreger, Ralph M., and Miller, Kent S. "Comparative Psychological Studies of Negroes and Whites in the United States," Psychological Bulletin, LVII (1960), 361-402.

Eells, Kenneth. "Some Implications for School Practices of the Chicago Studies of Cultural Bias in Intelligence Tests," Harvard Educational Review, XXIII (1953), 284-297.

English, Horace B., and English, Ava C. A Comprehensive Dictionary of Psychological and Psychoanalytical Terms. New York: David McKay Company, Inc., 1958.

Fahmy, M. Initial Exploring of the Shilluk Intelligence. Cairo: Dar Misr Printing Company, 1954.

Fitzgerald, J. A., and Ludeman, W. W. "The Intelligence of Indian Children," Journal of Comparative Psychology, VI (1926), 318-328.

Garth, Thomas R., Serafini, T. J., and Dutton, Dewey. "The Intelligence of Full Blood Indians," Journal of Applied Psychology, IX (1925), 382-389.

Gaw, Frances. "A Study of Performance Tests," British Journal of Psychology, XV (1925), 374-392.

Havighurst, R. J., and Hilkevitch, R. R. "The Intelligence of Indian Children as Measured by a Performance Scale," Journal of Abnormal Social Psychology, XXXIX (1944), 419-433.

Hebb, Donald O. A Textbook of Psychology. Philadelphia and London: W. B. Saunders Company, 1958.

Hiner, Gladys W. "A Comparison of Associative Learning Rates of Bright, Normal and Retarded Children." Unpublished Ph.D. dissertation, University of Oklahoma, 1962.

Hunt, Joseph McV. Intelligence and Experience. New York: Ronald Press Company, 1961.

Hunter, Walter S., and Sommermier, Eloise. "The Relation of Degree of Indian Blood to Score on the Otis Intelligence Test," Journal of Comparative Psychology, II (1922), 257-277.

Klineberg, Otto. "Negro-White Differences in Intelligence Test Performance: A New Look At An Old Problem," American Psychologist, XVIII (1963), 198-203.

Kuipers, Cornelius C. "Results of an Intelligence Test Based on Indian Culture," University of New Mexico, Abstracts of Thesis, 1933-1937 (Albuquerque), 1946, 55-56.

Leahy, A. M. "Nature-Nurture and Intelligence," Genetic Psychological Monographs, XVII (1935), 235-308.

McCandless, Boyd. "Environment and Intelligence," American Journal of Mental Deficiency, LVI (1952), 674-691.

McGeoch, J. A. The Psychology of Human Learning. New York: Longmans, Green and Company, 1942.

Montague, David O. "Arithmetic Concepts of Kindergarten Children in Contrasting Socioeconomic Areas," Elementary School Journal, LXIV (1964), 393-397.

Munn, Norman L. Psychology. Boston: Houghton Mifflin Company, 1951.

_____. Introduction to Psychology. Boston: Houghton Mifflin Company, 1962.

Osborne, R. T. "Racial Differences in Mental Growth and School Achievement: A Longitudinal Study," Psychological Reports, VII (1960), 233-239.

Pasamanick, Benjamin, and Knoblach, Hilda. "The Contribution of Some Organic Factors to School Retardation in Negro Children," Journal of Negro Education, XXVII (1958), 4-9.

Piaget, Jean. The Origins of Intelligence in Children, 1936. Translated by Margaret Cook. New York: International University Press, 1952.

Popham, W. James. Educational Statistics; Use and Interpretation. New York: Harper and Row, 1967.

Rowe, E. C. "Five Hundred Forty-Seven White and Two Hundred Sixty-Eight Indian Children Tested by the Binet-Simon Tests," Pedogogical Seminary, XXI (1914), 454-468.

Russell, R. W. "The Spontaneous and Instructed Drawings of Zuni Children," Journal of Comparative Psychology, XXXV (1943), 11-15.

Siller, Jerome. "Socio-economic Status and Conceptual Thinking," Journal of Abnormal and Social Psychology, LV (1957), 365-371.

Thurstone, L. L. Primary Mental Abilities. Chicago: University of Chicago Press, 1935.

Welsh, James A. "Associative Learning Rates of Bright, Normal, and Retarded Children Using Paired-Associate Lists of Varying Lengths." Unpublished Ph.D. dissertation, University of Oklahoma, 1967.

APPENDIX

RAW SCORES

SIXTH GRADE WHITES

Subject	CA	IQ	Trials	Errors
1	150	102	7	52
2	145	101	7	38
3	139	109	8	39
4	149	96	8	28
5	144	96	11	57
6	140	94	10	61
7	141	102	8	43
8	150	101	6	25
9	138	108	7	28
10	145	106	3	13
11	136	106	6	40
12	143	105	8	42
13	149	93	10	57
14	138	98	9	29
15	143	95	5	35
16	137	95	9	73
17	140	99	10	63
18	144	103	4	19
19	141	106	7	47
20	114	92	12	64
21	139	93	9	62
22	146	104	3	11
23	139	94	5	28
24	146	105	7	31
25	145	105	4	13
26	144	103	8	44
27	136	97	12	57
28	152	95	11	59
29	142	103	9	37
30	140	108	5	28
31	146	96	5	25
32	142	108	6	31
33	144	110	3	17
34	144	107	8	55
35	143	104	7	57
36	146	93	9	55
Mean	142.22	100.88	7.38	40.63

RAW SCORES

SIXTH GRADE INDIANS

Subject	CA	IQ	Trials	Errors
1	147	106	7	37
2	158	99	5	31
3	158	110	4	25
4	138	109	6	42
5	138	96	5	15
6	145	96	10	60
7	141	98	9	68
8	157	95	7	35
9	138	102	4	21
10	145	110	5	35
11	115	95	4	22
12	137	99	5	31
13	144	102	4	16
14	162	100	4	15
15	167	91	10	68
16	140	99	8	37
17	136	105	4	17
18	137	99	7	39
19	136	93	6	31
20	135	98	5	21
21	134	100	5	31
22	135	107	8	41
23	141	96	5	28
24	137	95	4	19
25	137	109	7	40
26	139	91	8	55
27	139	101	7	41
28	137	107	5	23
29	142	103	9	45
30	140	101	9	53
31	145	98	6	30
32	135	106	3	17
33	135	103	4	17
34	137	91	4	23
35	139	100	9	61
36	152	90	6	43
Mean	143.0	100.0	6.05	34.25

RAW SCORES

FOURTH GRADE WHITES

Subject	CA	IQ	Trials	Errors
1	121	98	7	49
2	125	94	7	42
3	122	103	5	31
4	121	99	3	16
5	123	103	6	30
6	122	100	11	55
7	134	91	4	13
8	128	90	6	29
9	122	92	6	39
10	122	106	9	57
11	123	101	5	29
12	121	92	8	46
13	114	90	10	61
14	142	93	10	59
15	113	92	11	71
16	113	105	9	50
17	124	99	7	46
18	122	94	13	76
19	122	98	9	45
20	116	110	5	24
21	121	104	4	12
22	121	109	5	26
23	129	95	6	34
24	113	91	7	45
25	125	95	11	72
26	112	103	6	35
27	114	108	5	37
28	122	102	10	59
29	120	110	11	60
30	114	109	8	56
31	114	102	9	53
32	122	96	7	39
33	113	102	6	34
34	121	98	7	36
35	117	105	8	57
36	139	90	9	53
Mean	121.3	99.13	7.5	43.77

RAW SCORES

FOURTH GRADE INDIANS

Subject	CA	IQ	Trials	Errors
1	128	101	6	35
2	114	105	7	40
3	121	101	6	32
4	136	98	6	34
5	123	96	4	20
6	136	92	6	29
7	130	103	9	72
8	111	109	9	47
9	122	95	6	38
10	112	109	9	69
11	114	101	10	54
12	114	101	5	27
13	124	95	6	31
14	129	96	8	60
15	119	104	10	48
16	112	100	12	76
17	125	100	10	71
18	113	92	7	50
19	113	96	7	36
20	112	99	6	31
21	109	92	7	43
22	113	104	9	40
23	120	105	6	38
24	120	91	5	33
25	117	106	8	55
26	116	98	6	33
27	115	100	5	27
28	110	95	10	66
29	119	95	8	46
30	115	95	3	22
31	116	96	7	39
32	118	103	9	56
33	136	103	8	63
34	124	104	8	55
35	120	108	4	26
36	118	103	5	24
Mean	119.27	99.75	7.13	43.5

RAW SCORES

SECOND GRADE WHITES

Subject	CA	IQ	Trials	Errors
1	93	99	16	99
2	88	104	7	33
3	95	91	17	120
4	90	95	8	45
5	95	108	7	35
6	89	108	8	48
7	93	98	11	54
8	89	102	18	96
9	92	97	11	47
10	90	96	8	48
11	100	95	10	42
12	100	98	8	34
13	94	100	7	30
14	90	97	18	102
15	86	101	6	29
16	98	93	7	46
17	91	98	12	82
18	93	104	10	62
19	91	101	8	53
20	97	103	9	46
21	98	100	5	23
22	89	95	12	65
23	95	105	8	51
24	91	108	13	97
25	89	95	9	59
26	88	92	9	57
27	91	101	15	97
28	91	95	7	55
29	95	103	9	58
30	89	99	11	58
31	90	101	11	73
32	95	93	7	54
33	88	101	10	54
34	93	98	10	52
35	91	105	15	74
36	77	106	14	82
Mean	91.77	99.58	10.3	60.0

RAW SCORES

SECOND GRADE INDIANS

Subject	CA	IQ	Trials	Errors
1	102	101	16	85
2	87	109	17	103
3	102	95	10	54
4	94	103	9	61
5	95	94	10	70
6	101	91	11	61
7	96	97	8	45
8	94	103	6	33
9	97	109	9	48
10	89	92	8	54
11	92	96	15	80
12	95	92	10	37
13	88	110	7	54
14	91	101	14	82
15	91	108	7	47
16	87	94	17	125
17	102	94	9	57
18	91	105	9	38
19	97	97	9	59
20	88	101	15	76
21	93	91	6	38
22	95	90	5	26
23	99	91	6	30
24	91	95	10	42
25	94	91	4	21
26	92	91	8	45
27	96	91	6	34
28	90	98	8	45
29	106	91	11	66
30	97	92	9	64
31	93	95	12	65
32	92	105	9	46
33	90	96	8	43
34	96	92	12	62
35	94	91	10	52
36	94	93	11	70
Mean	94.19	96.8	9.75	58.83